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mitted to import apparatus duty free, while private investigators, usually less able to afford expense, are obliged to pay duty, therefore

Be it Resolved, That the American Philosophical Society hereby requests the representatives of the State of Pennsylvania in the Congress of the United States to use all possible efforts to have placed on the free list books pertaining to the physical, natural and medical sciences, and apparatus intended for purposes of scientific research or of education, and further be it

Resolved, That a copy of these preambles and resolutions be forwarded to each member of Congress from the State of Pennsylvania.

And the meeting was adjourned.

Stated Meeting, January 16, 1885.

Present, 20 members.

President, Mr. FRALEY, in the Chair.

Donations for the Library were received from the Mining Department at Melbourne; the Academy of Arts and Sciences at Batavia; the Royal Asiatic Society; the Royal Academy dei Lincei; the Geographical Society at Paris; the Revue Politique; the Meteorological Society and Meteorological Council at London; the Journal of Forestry; London Nature; the Geological and Natural History Survey of Canada; the Boston Society of Natural History; the Museum of Comparative Zoölogy; the American Chemical Society; Mr. R. R. Bowker, New York; Mr. C. E. Beecher, of Albany; the American Journal of the Medical Sciences; the College of Pharmacy; the Franklin Institute; Mr. Henry Phillips, Jr.; Dr. E. W. Syle; the American Chemical Journal; Johns Hopkins University; the Treasury Department; the Chief Signal Office; the United States Commission of Fish and Fisheries; Mr. Jed. Hotchkiss, of Staunton, Va.; and the Minnesota Historical Society.

Mr. Henry Phillips, Jr., deposited in the Library "The Numismatic Chronicle and the Journal of the London Numismatic Society," 1882, Parts 1, 2, 3, 4; 1883, Parts 1, 2, 3, 4; 1884, Parts 1, 2, 3.

Dr. Syle presented the "Common Prayer" in Chinese, published in Philadelphia and printed in New York in 1884; also a Japanese adaptation of Kindergarten songs, published in Tokio in 1884.

Dr. Curwen read an obituary notice of the late Dr. Thomas S. Kirkbride.

Dr. George A. Koenig presented a communication entitled a "Note on Cosalite, Alaskaïte and Beegerite."

Dr. A. S. Packard, Jr. (of Providence, R. I.), presented (by letter) a communication "On the Embryology of *Limulus polyphemus*, III."

Prof. Pliny E. Chase read a paper "On the Results of an Important Weather Forecast."

Mr. Blasius read a paper "On the Brilliant Sun-glows of the Autumns of 1883 and 1884," which was followed by some remarks by Dr. Syle relative to the well-known sunsets in the tropics and equatorial regions, where moisture was usually most abundant.

Mr. Henry Phillips, Jr., was elected Librarian for the ensuing year.

The following new members were elected:

Prof. Lyman B. Hall, Haverford College, Pa.

Dr. Albin Weisbach, Freiburg, Saxony.

Prof. James W. Moore, Lafayette College, Easton, Pa.

Hon. Samuel J. Randall, Philadelphia.

Hon. George L. Harrison, Philadelphia.

Mr. Frederick Gutekunst, Philadelphia.

Mr. Edward H. Weil, Philadelphia.

Mr. Samuel Wagner, Philadelphia.

Mr. C. Stuart Patterson, Philadelphia.

Dr. Theophilus Parvin, Philadelphia.

Prof. George Inman Riché, Central High School, Philadelphia.

Prof. Francis A. Jackson, University of Pennsylvania, Philadelphia.

Prof. Wm. Osler, University of Pennsylvania, Philadelphia.

Mr. George B. Roberts, President of the Pennsylvania Railroad, Philadelphia.

Mr. Thomas Hockley, Philadelphia.

Dr. James C. Wilson, Philadelphia.

Prof. J. W. Mallet, Jefferson College, Philadelphia.

Prof. Samuel W. Gross, Jefferson College, Philadelphia.

New nomination No. 1049 was read.

The following Standing Committees were chosen for 1885:

Finance,

Henry Winsor, J. Price Wetherill, William B. Rogers.

Publication,

Daniel G. Brinton, Charles M. Cresson, George H. Horn,
Persifor Frazer, J. Blodgett Britton.

Hall,

J. Sergeant Price, William A. Ingham, Charles G. Ames.

Library,

Henry Phillips, Jr., Edwin J. Houston, William V. McKean, Thomas H. Dudley, John R. Baker.

The Treasurer presented the annual report of the Trustees of the Building Fund.

And the meeting was adjourned.

*The limits of stability of nebulous Planets, and the consequences resulting from their mutual relations.** *By Prof. Daniel Kirkwood.*

(Read before the American Philosophical Society, November 21, 1884.)

To determine the height of the atmosphere is a problem of no common difficulty. This is evident from the fact that estimates derived from the phenomena of twilight, luminous meteors, and the aurora borealis have been widely various. It cannot extend, however, beyond the limit at which its elasticity is counterbalanced by the force of gravity—a limit probably not less than two hundred miles from the earth's surface. Even the volume and weight of this atmospheric envelope are not absolutely constant, as small quantities of gaseous matter are doubtless brought into it from time to time by meteors and meteoric streams. Nor has this accession of matter from without been the only source of variation ; it has been shown by several writers that the extent and density during the cycles of geologic time were in all probability much greater than at present.

But whatever the mass or density of the earth's gaseous envelope, an absolute limit—corresponding to the earth's present time of rotation—may be assigned it. "The atmosphere," says Laplace, "can only extend itself at the equator to the point where the centrifugal force exactly balances the force of gravity ; for it is evident that beyond this limit the fluid would dissipate itself." This limit for the earth is 26,240 miles from the centre ; for Saturn it is within the system of rings ; and for the sun it is at the distance of sixteen millions of miles. These distances, however, were obviously greater before the members of the system had contracted to their

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* A preliminary discussion of equation (1) in the following paper was given in the Analyst for January, 1881. Those solutions are here revised, and the results for each planet carefully determined.